PATENT COOPERATION TREATY

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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IP LAW

PCT

WRITTEN OPINION
(PCT Rule 66)

Date of mailing *(day/month/year)*	31.01.2005
Applicant's or agent's file reference 2002M179	**REPLY DUE within 1 month(s) and 15 days** from the above date of mailing

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP 03/12881	18.11.2003	20.11.2002

International Patent Classification (IPC) or both national classification and IPC
C07C51/36

Applicant
EXXONMOBIL CHEMICAL PATENTS INC. et al

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

I	☒	Basis of the opinion
II	☐	Priority
III	☐	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	☐	Lack of unity of invention
V	☒	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	☐	Certain documents cited
VII	☐	Certain defects in the international application
VIII	☐	Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis. For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 20.03.2005

Name and mailing address of the international preliminary examining authority:

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01 FEB 2005

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I. Basis of the opinion

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed")*:

Description, Pages

1-30 as originally filed

Claims, Numbers

1-52 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:
   - ☐ the drawings, sheets:

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-6,12-16,18-24,31-52
Inventive step (IS)	Claims	1-6,12-52
Industrial applicability (IA)	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. **Documents**

Reference is made to the following documents:

D1: US-A-5 286 898 (15 February 1994)

D2: US-B1-6 284 917 (4 September 2001)

2. **Subject matter**

Claims 1-48 define a process for the hydrogenation of benzenepolycarboxylic acids or derivatives with hydrogen, in the presence of a catalyst on a support. The catalyst support comprises one or more mesoporous materials (average pore diameter of 2-50 nm). Higher selectivity and less by-products ("lights") are obtained. Claims 49-52 define a cyclohexanepolycarboxylic acid, -ester or anhydride or its composition obtained via the abovementioned process.

3. **Novelty**

The document D1 discloses (abstract, column 2, line 60 to column 5, line 6, examples 1-18, claims 1-8) the hydrogenation of dimethyl terephthalate using hydrogen and a ruthenium, nickel or platinum catalyst on an alumina support, having a pore diameter of 211 to 224 Å (21-22 nm). Therefore, with respect to the process claims, the subject-matter of independent claim 1 and of dependent claims 12-16,18,32,33,36,37,46-48 is not novel over D1 (Article 33(2) PCT).

Claims 2-11,17,19-31,34,35,38-45 define additional features relating to the subject-matter of the process claims, which are not disclosed in D1. Therefore, the subject-matter of the dependent claims 2-11,17,19-31,34,35,38-45 is novel over D1 (Article 33(2) PCT).

The document D2 discloses (abstract, column 5, line 6 to column 6, line 41, column 7, line 58 to colunn 12, line 23, examples 1-14, claims 1-21) the hydrogenation of benzenepolycarboxylic acid or a derivative thereof using hydrogen and a supported ruthenium catalyst, in which the support is a mixture of a mesoporous and a macroporous support of aluminum oxide. Therefore, the subject-matter of independent claim 1 and of dependent claims 2-6,12-14,19-24 and 31-48 is not novel over D2 (Article 33(2) PCT).

Claims 7-11,15-18,25-30 define additional features relating to the subject-matter of the process claims, which are not disclosed in D2. Therefore, the subject-matter of the dependent claims 7-11,15-18,25-30 is novel over D2 (Article 33(2) PCT).

Document D2 also defines cyclohexanepolycarboxylic acids its esters and its anhydrides for the use as plasticizer. Regarding the subject-matter of product claims 49-52, it is noted that the addition that a compound is prepared by a novel and inventive process, does not necessarily render the product (and composition) novel and inventive. The subject-matter of claims 49-52 is not new over document D2 (Article 33(2) PCT).

4. Inventive step

As far as the claims are novel, the document D2 is regarded as being the closest prior art to the subject-matter of independent claims 7-11,17,25-30 (see above). The subject-matter of independent claims 7-11,17 and 25-30 differs in the type of support, its way of preparation, the type of metals added to the catalyst and the metal dispersion value relating to the strongly chemisorbed component of the catalyst.

The problem to be solved by the present invention may be regarded as an improved process for the hydrogenation of benzenepolycarboxylic acid or a derivative thereof, resulting in a higher reactionselectivity and lower by-products (e.g. "lights"). The use of a catalyst on an support comprising one or more ordered mesoporous materials makes an important contribution thereto.

The document D2 of the prior art does not diclose any process which solves the problem in the same way as the present application, namely by using a mesoporous silica as the catalyst support (preferably MCM-41). Thus, given the teaching of the prior art, the skilled person would not consider solving the problem in the same way as the present application, and he certainly would not expect the improvement associated with the present application. Therefore, the solution proposed in claims 7-11 of the present application can be considered as involving an inventive step (Article 33(3) PCT).

However, as far as the novel claims 17 and 25-30 are concerned, the addition of the technical feature compared to claim 1, about the addition of one or more metals of transition group I or VII of the Periodic Table to the catalyst (for claim

17) and/or the characterisation of the catalyst by its metal disperson value (for claims 25-30) can be seen as a selection based on claim 1. An inventive step can only be acknowledged when such a selection results in an unexpected effect, which has not been shown in this application (e.g. by comparative tests). Therefore, the solution proposed in claims 17 and 25-30 of the present application can not be considered as involving an inventive step (Article 33(3) PCT).

5. Other remarks

As the claim 1 stands it is not clear which part of the benzenepolycarboxylic acid or its derivative, is hydrogenated; the benzene ring or the carboxylic acid (derivative) moiety. Incorporation of a class of products into the claim would solve this clarity problem.